REFERENCE MARKER - PHOTOPOINT RESOURCES MANAGEMENT SYSTEM

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Research/Resources Management Report SER-62

Jerry L. Case[1], Patrick L. Toops[2], and Stephen V. Shabica [3]

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U. S. Department of the Interior
National Park Service
Southeast Regional Office
Natural Science and Research Division
75 Spring Street, S.W.
Atlanta, Georgia 30303

[1]Present address: Glacier Bay National Park and Preserve, Gustavus, AK 99826
[2]Present address: Buffalo National River, P. O. Box 1173, Harrison, AR 72601
[3]Coastal Field Research Laboratory, Gulf Islands National Seashore, NSTL Station, MS 39529

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ABSTRACT

A Reference Marker - Photopoint System is described. The system provides a means of documenting natural and human-related physical changes in a natural resource base. However, it may be easily adapted for documenting changes in cultural resources. The system has multiple uses, is aesthetically unobtrusive, and sufficiently permanent to provide natural resource base information today and in the future. The materials required and the procedures for establishing a Reference Marker - Photopoint System are outlined, and examples given of natural and human related changes.

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INTRODUCTION

The development and implementation of resource assessment and monitoring programs are essential elements of any resources management function. Baseline data of the resources and documentation of changes through time are needed in making management decisions that affect the resource base. At Gulf Islands National Seashore, natural resources management programs are the direct responsibility of the Science and Resources Management Section of the Division of Visitor Protection and Resource Management. Such programs include the monitoring of on-going research studies, assisting researchers in their studies, and carrying out studies to obtain information relating to park resource management situations. The questions asked and information compiled by the field ranger are in many instances the primary justification for in-depth research studies. Without the involvement and the observational power of field personnel, many important resource problems might otherwise be overlooked.

A need existed for a natural resource documentation system that had multiple uses, was aesthetically unobtrusive, and sufficiently permanent to provide valuable information now and in the future. With these criteria, a Reference Marker - Photopoint Resources Management System (Reference Marker: a marker used as a reference to locate photopoints, transects, sampling and other important locations; Photopoint: a geographic location from which photographs are taken) was set up at Gulf Islands National Seashore on Petit Bois, Horn, and East and West Ship Islands, Mississippi.

The Reference Marker - Photopoint System provides a means of documenting natural and man-related physical changes in a natural resource base, and is a primary research tool of the Gulf Islands National Seashore resources management program. There are numerous applications of this type of system. Fulton (1981) and Brater (1975) demonstrated the use of historical photographs in tracing and monitoring shoreline recession and erosion. Franklin (1978) used photographs taken in 1916 and 1976 to identify 60 years of natural ecological change in the Maroon Bells - Snowmass Wilderness of Colorado. A very detailed comparative photographic

study was performed by Gruell (1981) of the fire and habitat history of the Bridger-Teton National Forest, Wyoming. His 85 pairs of photographs, spanning 103 years, detailed the periods of change and/or stability in the contours and vegetation of the area's natural levees, ridges, springs, seeps, meadows, drainages, gullies, valleys, mountain slopes, and canyon bottoms. Gruell's study emphasized the role of fire as a primary driving force in wilderness vegetation development. Yet, other information was found pertinent to esthetics, fisheries, forestry, range, geology, soils, hydrology, and fire management. For example, the pictorial study provided insight into natural resource issues in the Jackson Hole area. Concern had been expressed that human settlement had caused an increase of land erosion. However, on moderate slopes, Gruell's photographs showed that many gully patterns and depths appear nearly the same after 50 to 75 years. Present day run-off from steep slopes at high elevations in the Tetons is heavy. But the photos of the late 1800's show equally heavy run-off. The long-range, historical resource view through Gruell's photographic study will be helpful to resource managers and land use planners in deciding which land use management policies would be best for the Jackson Hole area. In a related study, Gruell and others (1982) interpreted over 70 years of change in forest vegetation resulting from timber harvests and reduction in occurrence of fire. A series of photographs at approximately 10-year intervals provided the basis for their interpretations.

It should be noted, that in the studies by Brater (1975), Franklin (1978), Fulton (1981), and Gruell (1981), the old sets of photographs were not taken in a systematic study for monitoring long-term historical changes. These investigators had the insight to obtain old photographs and then rephotograph the same areas from the same perspective. The Reference Marker - Photopoint System we developed during this study goes beyond these previous studies by providing accurate surveyed points from which the photographs are always taken.

At Gulf Islands, to fulfill park management needs, five major areas were stressed. The system is used to document beach and dune accretion and erosion, plant succession, historic sites, bench marks and research plots, and visitor impacts.

Shoreline changes and the accretion and erosion of the beach, dunes and interdunal areas are natural phenomena. Yet human and feral animal activities in the area may hasten or retard the natural processes. The Reference Marker - Photopoint System qualitatively documents these dynamics. A series of physical measurements and photographs record the changes taking place.

The succession of plant communities is a slow, but continuing process. Many times these changes go unnoticed, especially after such natural phenomena as fire and hurricanes. The effects of these forces on the plant communities of Gulf Islands National Seashore are largely unknown. The photopoints will show the progression of vegetational change in response to these events through time.

The barrier islands have been and are the sites of numerous research projects. Often, once the projects were completed, the transects, plots, and study exclosures were abandoned. This program was designed to record these locations so that they could be relocated in the future. The reference markers are also used to facilitate locating geological survey markers presently buried in the dunes.

Some of the most important resource management information gained from the system is the documentation of visitor impact. Markers are established with transect measurements and photographs to monitor impacts on plant communities and dune systems associated with trails, campsites, and day use areas. For example, in the near future a park-operated boat will provide transportation to Horn Island for primitive camping. The information acquired from this system may assist managers in establishing carrying capacities for various portions of the island.

MATERIALS AND METHODS

The Reference Marker - Photopoint System is relatively inexpensive, functional, and simple to establish. The required materials, their approximate cost, and sources are shown in Table 1.

Table 1. The required materials for the Reference Marker - Photopoint System, their estimated cost, and sources.

Item	Source	Estimated Cost
35 mm Camera (Pentax) and 50 mm, F=2 Takumar Lens	GSA Schedule	$250.00
Fiberglass Measuring Tape (Keson 100 m)	Forestry Suppliers Jackson, MS	$ 69.95
Compass (Silva)	Forestry Suppliers Jackson, MS	$ 4.95 - $40.00
PVC Pipe (1" ID)	Local	$ 0.69 per ft.
Cement	Local	$ 2.95 per 85 lb.
Anchor Nails, #30	Local	$ 4.00 per 100
Perma-Mark Polyethylene Surveyor Markers (1" plug)	Forestry Suppliers Jackson, MS	$ 19.25 per 100
Hand Stamped Steel Dies ($\frac{1}{4}$" characters, #0-9)	Forestry Suppliers Jackson, MS	$ 8.45
Aluminum Tags	Forestry Suppliers Jackson, MS	$ 3.50 per 100
Aluminum Nails, 2 1/8"	Forestry Suppliers Jackson, MS	$ 3.20 per 575
Slide Holder Viewers (2" x 2", side loading)	Forestry Suppliers Jackson, MS	$ 7.75 per 25 pages
Post Hole Digger	GSA Schedule	$ 16.40
Hammer and Hacksaw	GSA Schedule	Under $6.00 total
Slide Film (ASA 64 or 25) and Processing	Local	$ 8.00 per roll

A 35 mm camera is the basic part of the photopoint system. Measurements of changes are more easily understood when supplemented by photographs. The use of 20-exposure, ASA 64 or 25 color slide film was found to be the best for our area. A 50 mm normal lens was found to be satisfactory for encompassing the desired survey areas at Gulf Islands. This focal length lens also provides a final photograph which, in perspective, is similar to that which the human eye perceives. For survey areas (fields, forests, forts, etc.) requiring greater coverage, a 35 mm wide angle lens may be employed. However, some peripheral distortion and reduced subject size should be expected. Essentially, one exchanges some subject definition for a greater area. In the event a very specific object (statue, monument, flower, tree, etc.) requires monitoring, a 100-120 mm lens can be used. Used in this manner, very little subject distortion will occur in the final photograph. In parks where a variety of monitoring situations occur, a zoom lens may be considered in order to reduce costs and equipment transportation weight. If different focal length lenses are used, the focal length should always be noted on the Photopoint Record Sheet.

In a saltwater and/or sand environment, a fiberglass measuring tape is easier to maintain than a metal tape. The fiberglass tape will not rust, crimp or break when accidentally stepped on.

It is necessary to use a compass such as the Silva Ranger 15 which is hand-held and has an accuracy of $\pm 1^{o}$. A quality compass is required so that the photographs are consistently taken from the same azimuth. Bearings were taken with the compass resting on the level top of the photopoint post. Care must be taken to ensure that yearly magnetic variation is accounted for when taking magnetic azimuth readings. This is especially important in the western and central United States, and through time. For example, if an area had a magnetic variation of 20 minutes per year, in three years the azimuth would be one degree off. In 12 years, it would be four degrees off!

The survey station markers were ordered pre-stamped with "NPS." The polyethylene markers are inexpensive to replace and are not affected by rain or

salt spray. These can be used with one-inch inside diameter polyvinylchloride (PVC) pipe. Steel die stamps were used to number the polyethylene markers.

Plastic slide holders (20-slide size) for a 3-ring binder were obtained for storage of the slides in the field. The side-loading style was selected to keep dust out of the pockets, when placed on a bookshelf. Separate slide holders are used for each reference marker, with the appropriate data written on each slide. Recent studies have suggested that certain types of plastic film slide holders can damage slides due to the chemical (vinyl chloride) characteristics of the slide holder. Consequently, metal cabinet-type slide storage files or metal slide storage boxes should be used for archival storage of the original slides and black and white negatives. Whichever method is chosen, however, the area where the slides are stored should be temperature and humidity controlled to ensure long-term preservation of the slides. Humidity control is more critical than temperature control, and every effort should be made to maintain the photographic material at the lowest economically feasible humidity. In time, color slides tend to fade. Thus, in 50 to 75 years the recorded images may lose much of their information. Preparing black and white negatives, rather than color slide duplicates, of each photopoint slide would ensure that in 100 years the information would still be available. This is a relatively inexpensive method of ensuring that the photographs are preserved.

The one-inch inside diameter PVC pipe, cement, nails, hammer, hacksaw, and post hole digger were purchased locally. PVC pipe was chosen because it is resistant to saltspray, does not rot, is durable, its white color blends in with the white sand, and its round shape provides less resistance to wind and oceanic overwash. Only one marker was lost during Hurricane Frederic in September 1979, but most markers had sand washed from around them.

Aluminum identification tags and nails are discreetly used to mark witness points to assist in relocating a reference marker should one be lost. We used the tags only for reference markers situated in areas of high erosion and/or vandalism.

Figure 1 shows a composite of the field equipment necessary during the performance of the actual surveys.

A wooden mold was built to hold 8 markers with a 6 inch (15 cm) cubic cement base to manufacture the reference markers (Fig. 2). On the expanded end of a 5 ft (1.5 m) length of 1 inch (2.5 cm) PVC pipe, a hole was drilled and a #30 nail placed through the hole to anchor the pipe in the cement. A concrete base is needed in the sandy substrate of Gulf Islands National Seashore to keep the marker from being pulled up. Reference markers can also be constructed by placing the same PVC pipe into a 1 gallon (3.8 liters) plastic milk or juice jug from which the top one-third has been removed. The jug is then filled with cement. An 85 lb (38.6 kg) sack of concrete will make 14 markers with this technique. The plastic containers were left on the concrete bases after construction. This allowed the survey posts to be transported on patrol boats with minimal marring of the decks and bulkheads.

After the equipment had been assembled and the reference marker posts constructed, the next step in the project was to determine those resources and areas which we wished to monitor. Most of the photopoints monitor natural changes of the natural wilderness setting at Gulf Islands National Seashore. Several other photopoints were located in areas of high human visitation to monitor human-related resource impacts. Once each area to be monitored was determined, a site for placement of the reference marker was selected. In determining the reference marker placement, several guidelines were followed: (i) distance from subject - to ensure that the desired area was included and that an adequate border was provided to allow for slight variations in future camera positioning; (ii) distance from beach - to prevent loss of marker due to erosion; (iii) seclusion - to preserve natural scenery and reduce vandalism; and (iv) accessibility - must be close to the monitoring area.

After the location had been chosen, the reference marker was planted with the use of a posthole digger. The PVC pipe was then cut off approximately 6 inches (15 cm) above the ground. A prenumbered survey plug was placed into the opening

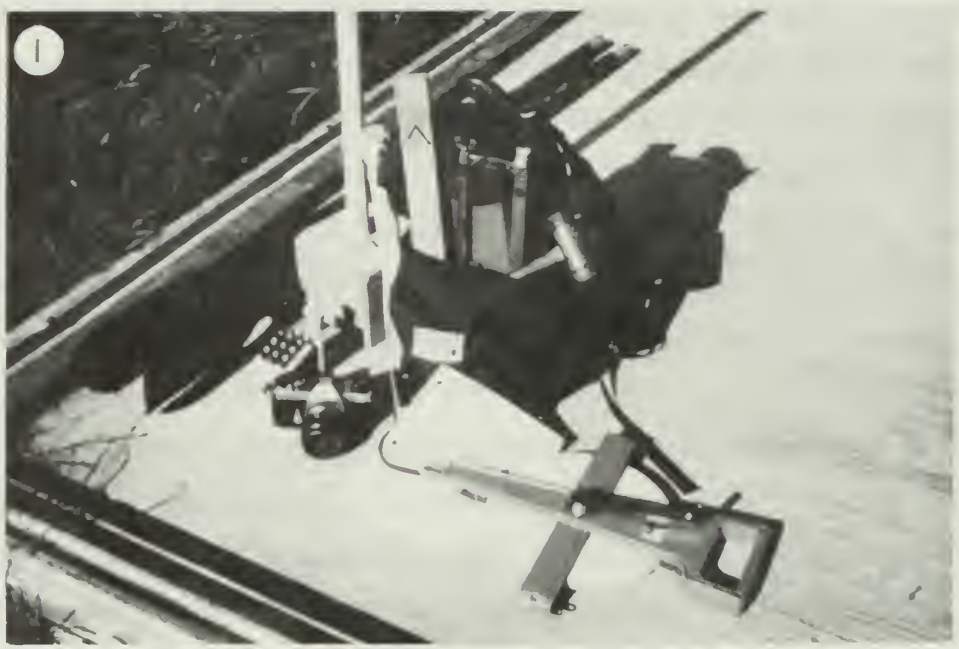

Fig. 1. Equipment for field survey.

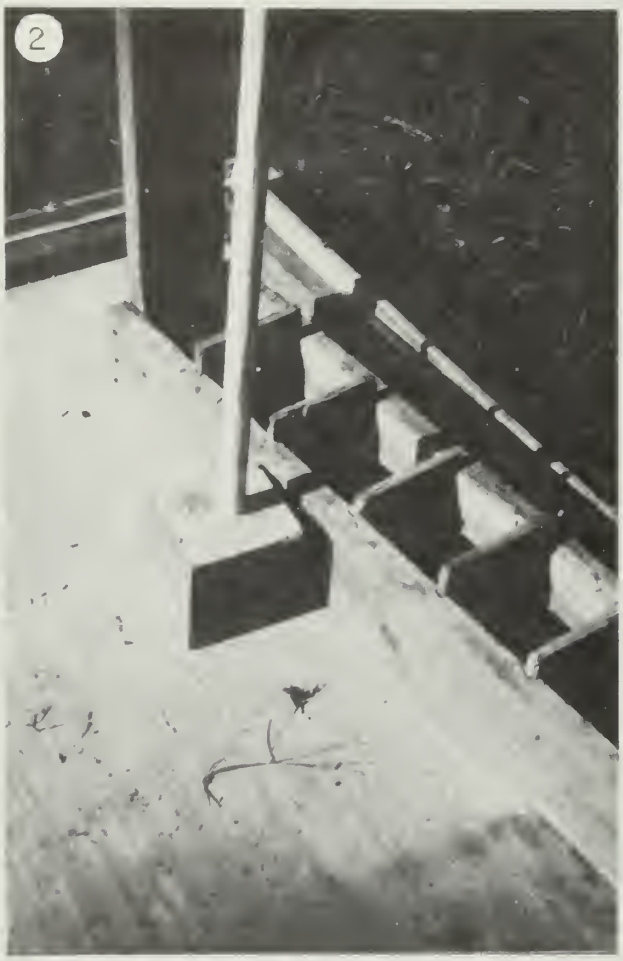

Fig. 2. Marker and cement form.

and secured with the hammer until flush against the pipe, taking care not to mar the numbers (Fig. 3).

From the reference marker, photopoints were established at set azimuths and distances (Figs. 4 and 5). The compass was placed on the top of the reference marker and the azimuths determined. To assist in taking measurements, a cap was constructed from the expanded portion of a 1 inch (2.5 cm) PVC pipe, 3 inches (7.5 cm) in length, to slip over the reference marker. A screw hook was placed in the side of the cap to hold the end of the 100-meter tape. Measurements are easier with two people; however, one person can do it with little trouble. From the photopoint a picture or pictures of the area(s) to be monitored was taken. The azimuth from the photopoint to the center of the photograph was recorded to assist in taking photo(s) of the same area(s) the next time photographs were taken (see Table 2 and Fig. 6).

There was a possibility that the reference markers could be vandalized or washed out, so witness points were established nearby. Witness points consisted of permanent trees, logs, or other objects that would facilitate relocation of a reference marker through distance and azimuth readings from each object to the reference marker location. Aluminum tags and nails may be used to mark these witness points. From an aesthetic and personal point of view, use discretion in the placement of these tags, using them only when the possibility exists that the reference marker and/or witness point could not be relocated. Witness points may be lost; trees die and fall, logs decompose. Thus, during each survey the presence-absence of all witness points should be checked. If one is missing, a replacement should be established and the distance and azimuth readings entered on the Reference Marker - Photopoint map (Fig. 6).

Distance measurements from the reference markers to the various land features being monitored were also taken (e.g., dunes, average water mark (approximately one-half the distance between the highest and lowest point of the wave as it rolls on to the beach), escarpments, marker height). Because the islands are in a continuous state of change, these measurements are made each time the photographs are taken.

Fig. 3. Inserting survey plug.

Fig. 4. Measurement.

Fig. 5. Measuring height of post.

Table 2. Reference Marker - Photopoint System Survey Sheet. Reference Marker #4, Horn Island.

REFERENCE MARKER - PHOTOPOINT SYSTEM SURVEY SHEET

ESTABLISHED DATE 8/1/79 MARKER NUMBER 4

GEOGRAPHIC AREA Horn Island RECORDER(S) Case/Fitzgerald

LOCATION North beach - 1 mile east of Arcturus Flats. TRANSECT(S) No

AREA DESCRIPTION

North: Approx. 30 m to the sound. Gentle rolling dunes with medium vegetation cover.

East: Dunes of the same level as around the RM. Pines in the distance. Medium vegetation cover of bushes and grasses.

South: Large grove of pine to the SSW with scattered young pine throughout the area. Medium to heavy vegetation cover of bushes (Rosemary) and some grasses and Saw Palmetto.

West: An upward slope to the dunes. Many pines in the area. Medium vegetation cover of bush type. On the beach is a dead tree with an old Fish & Wildlife sign on it.

WITNESS POINTS

Azimuth	Meters	Object
102	43.15	Tree #1
200	15.42	Tree #2
325	29.51	Tree #3

PHOTOPOINTS

Azimuth	Meters	Number
18	25.0	#1

PHOTOGRAPHS

Photopoint(s)	Azimuth(s)
#1	115, 198, 280

OBJECTIVE

To record through photographs and measurements the changes in beach and dune structure due to natural and human impacts.

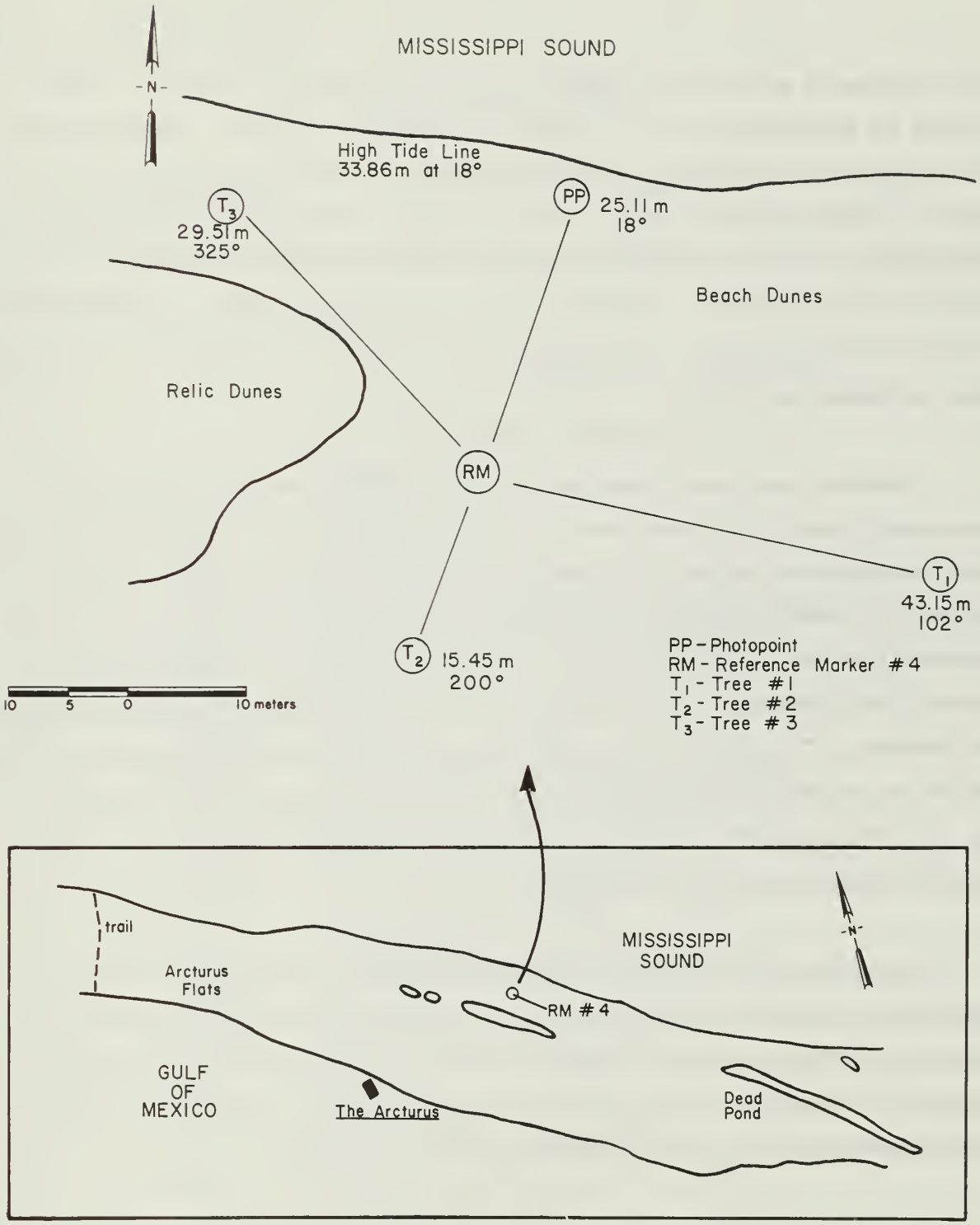

Fig. 6. Map of Reference Marker - Photopoint location, Reference Marker #4, Horn Island.

The photographs and all measurements are done on a quarterly basis throughout the year for each photopoint. The frequency of performing the surveys may vary in other areas where natural and human changes are minimal (high mountains, deserts, remote wilderness areas, buildings, etc.). The photographs provide qualitative evidence of the change, and the measurements quantify this change. During periods of adverse lighting conditions (fog, rain, clouds, bright sunshine), multiple exposures should be taken. Bracket the initial exposure with exposures, one F-stop above and below the initial.

Transects were established to measure the visitor impact on vegetation and dunes along trails. This was done by placing two permanent PVC pipes in the ground, one on each side of the trail. A measuring tape was then stretched between them at post height. While standing over the tape, readings were taken from post to post, recording the type of vegetation/ground cover in the specific location along the transect (see Table 3). When there was more than one species, the dominant species was recorded. To provide a cross-trail ground profile, the height from the stretched tape to the ground was measured at .5 meter (20 inch) intervals (see Table 4 and Fig. 7). The direction of reading was recorded on the form to ensure that the tape was read in the same direction each time.

Once the reference marker, photopoints, witness points and/or transects were established, the survey information was recorded on data forms designed for this program (see Tables 5 and 6). Maps to scale (Fig. 6) were made to assist new personnel in locating the area and the measurement points. All forms and data for each reference marker are kept with the slides in a notebook.

Table 3. Impact Survey Form, Reference Marker #17, Horn Island, Cross-Island Trail, 2/21/80

IMPACT SURVEY FORM

DATE 2/21/80 COLLECTOR CASE

LOCATION HORN IS., CROSS-IS. TRAIL TRANSECT LENGTH 9.92 METERS

REF. MARKER # 17

FROM	TO	VEGETATIVE DESCRIPTION
0	.5	YAUPON (ILEX VOMITORIA)
.5	.8	SAND
.8	.9	YAUPON
.9	1.0	SAND
1.0	2.4	FLOWERING GOLDENROD (SOLIDAGO PAUCIFLOSCULOSA)
2.4	2.8	SAND
2.8	4.1	TRAIL
4.1	4.75	SAND
4.75	4.95	ROCK ROSE (HELIANTHEMUM)
4.95	6.0	SAND
6.0	6.2	FLOWERING GOLDENROD
6.2	6.9	PINE NEEDLE MAT
6.9	7.0	FLOWERING GOLDENROD
7.0	7.25	SAND
7.25	7.45	FLOWERING GOLDENROD
7.45	7.5	SAND
7.5	7.7	FLOWERING GOLDENROD
7.7	7.9	SAND
7.9	8.7	SEDGES (CYPERUS?)
8.7	9.92	PINE NEEDLE MAT AND GRASSES

Table 4. Ground Profile Form, Reference Marker #17, Horn Island, Cross-Island Trail, 2/21/80.

GROUND PROFILE

DATE 2/21/80 COLLECTOR TOOPS

LOCATION HORN IS., CROSS-IS. TRAIL TRANSECT LENGTH 9.92 METERS

REFERENCE MARKER #17 PHOTOPOINT #1 AZIMUTH 160°

DISTANCE	DEPTH	DISTANCE	DEPTH	DISTANCE	DEPTH
0	.20	7.5	.17	15.0	
.5	.37	8.0	.25	15.5	
1.0	.40	8.5	.27	16.0	
1.5	.47	9.0	.26	16.5	
2.0	.51	9.5	.24	17.0	
2.5	.53	~~10.0~~ 9.92	.19	17.5	
3.0	.59	10.5		18.0	
3.5	.67	11.0		18.5	
4.0	.48	11.5		19.0	
4.5	.28	12.0		19.5	
5.0	.19	12.5		20.0	
5.5	.15	13.0		20.5	
6.0	.14	13.5		21.0	
6.5	.12	14.0		21.5	
7.0	.13	14.5		22.0	

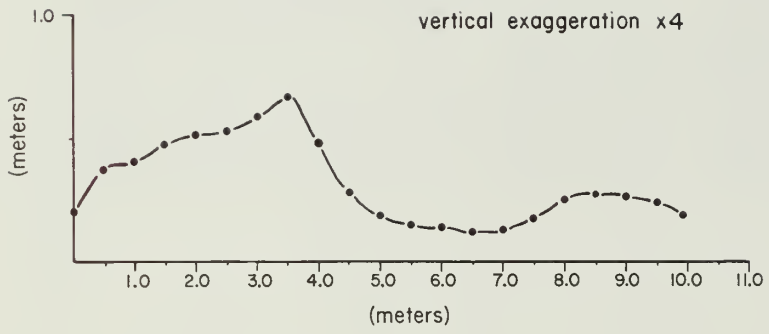

Fig. 7. Cross-trail ground profile, Reference Marker #17, Horn Island, 2/21/80.

Table 5. Data Record Form, Reference Marker #4, Horn Island.

DATA RECORD FORM

REFERENCE MARKER #4

GEOGRAPHIC AREA HORN ISLAND

TRANSECT (S) NO

DATE	8/1/79	9/19/79	2/20/80	5/6/80	8/19/80		
TIME	-	-	-	-	-		
MARKER HEIGHT	.48M	.22M	.2M	.21M	.19M		
AZIMUTH	18°	18°	18°	18°	18°		
AVERAGE WATER MARK	-	-	31.0M	28.2M	26.7M		
HIGH TIDE LINE	33.86M	28.5M	-	-	-		
*							
*							
*							
*							
*							
COMMENTS Note why measurements were taken.	TO ESTABLISH PHOTO POINT.	POST-HURRICANE FREDERIC (9/11-13/79) DATA.	QUARTERLY MEASUREMENTS.	QUARTERLY MEASUREMENTS.	QUARTERLY MEASUREMENTS.		

* Other Measurements

Table 6. Photopoint Record, Reference Marker #4, Horn Island.

PHOTOPOINT RECORD

REFERENCE MARKER #4

GEOGRAPHIC AREA HORN ISLAND

Date	Photo-point	Azimuth	Lens	Film (ASA)	Slide #	Filed Date	Recorder
11/78	1	280°			6	2/26/80	CASE/TOOPS
4/79	1	280°	50	400	19	2/26/80	CASE/TOOPS
9/19/79	1	115°	50	64	35	10/27/79	CASE/TOOPS
9/19/79	1	198°	50	64	33	10/27/79	CASE/TOOPS
9/19/79	1	280°	50	64	34	10/27/79	CASE/TOOPS
2/20/80	1	115°	50	64	10	3/15/80	CASE/TOOPS
2/20/80	1	198°	50	64	11	3/15/80	CASE/TOOPS
2/20/80	1	280°	50	64	12	3/15/80	CASE/TOOPS
5/6/80	1	115°	50		9	5/14/80	CASE/TOOPS
5/6/80	1	198°	50		10	5/14/80	CASE/TOOPS
5/6/80	1	280°	50		11	5/14/80	CASE/TOOPS
8/19/80	1	115°	50	25	0+1	8/26/80	CASE/TOOPS
8/19/80	1	198°	50	25	2	8/26/80	CASE/TOOPS
8/19/80	1	280°	50	25	3	8/26/80	CASE/TOOPS

RESULTS

The following series of figures (Figs. 8 to 14) demonstrate natural changes, human-related changes, and no observable change at several of the photopoints. Each series is documented with the types of measurements shown in Tables 3 and 4 and Figure 7. The photographs were taken by the first and second authors and by Mark Lewis, former Horn Island Park Technician.

The series in Figure 8 demonstrates the tenuous nature of human occupation of barrier islands in storm hazard areas.

Figure 9 shows the loss of a World War II incinerator chimney from hurricane impact and demonstrates very little natural change during the period of record.

Figure 10, also in the incinerator chimney area, shows a major pedestrian trail in the area. Such a series would document, through time, human related changes along the trail. For example, losses of vegetation or trail erosion might suggest to management that the trail be closed until monitoring demonstrated its recovery.

Figure 11, another pedestrian trail in the incinerator chimney area, shows the formation of a dune scarp. Whether this escarpment is human related or attributable to wind-water erosion is unknown. A series of photographs through time will allow resource managers to evaluate the status of the area.

Human-related shoreline changes are demonstrated in Figure 12. The shrimp boat wreck acted as an offshore breakwater (Fig. 12a) and ultimately a groin after the wreck became attached to the shore (Fig. 12c). While detached from the shore, the wreck formed a wave-current shadow between it and the shore. Consequently, waves and currents passing through the shadow deposited sediments as their transport capacity was reduced by a reduction in their sediment carrying capacity.

Figures 13 and 14 demonstrate natural shoreline recession and the filling of a washover pond, respectively.

a)

b)

Fig. 8. Reference Marker #20, Photopoint #1, azimuth 105°, Horn Island, looking at boat hoist and diesel shed. a) In November 1978, b) In September 1979 following Hurricane Frederic, c) In November 1980, d) In February 1981.

c)

d)

Fig. 9. Reference Marker #18, Photopoint #1, azimuth 70°, Horn Island, Chimney area. a) In November 1978, b) In September 1979 following Hurricane Frederic. Note that destroyed chimney (see Figs. 9a and 9c) was cropped during reproduction of B&W from the color transparency, c) In April 1980, d) In February 1981. Note very little relative vegetational change is observed for the period of record.

Fig. 10. Reference Marker #17, Photopoint #1, azimuth 160°, Horn Island, Chimney area, looking along major pedestrian trail to Chimney. a) In November 1978, b) In September 1979 following Hurricane Frederic, c) In February 1980. Note cross-trail transect tape used for quantifying vegetation and ground profile, d) In April 1980. Note persistence of drift deposited during Hurricane Frederic and lack of observable change in vegetation and profile.

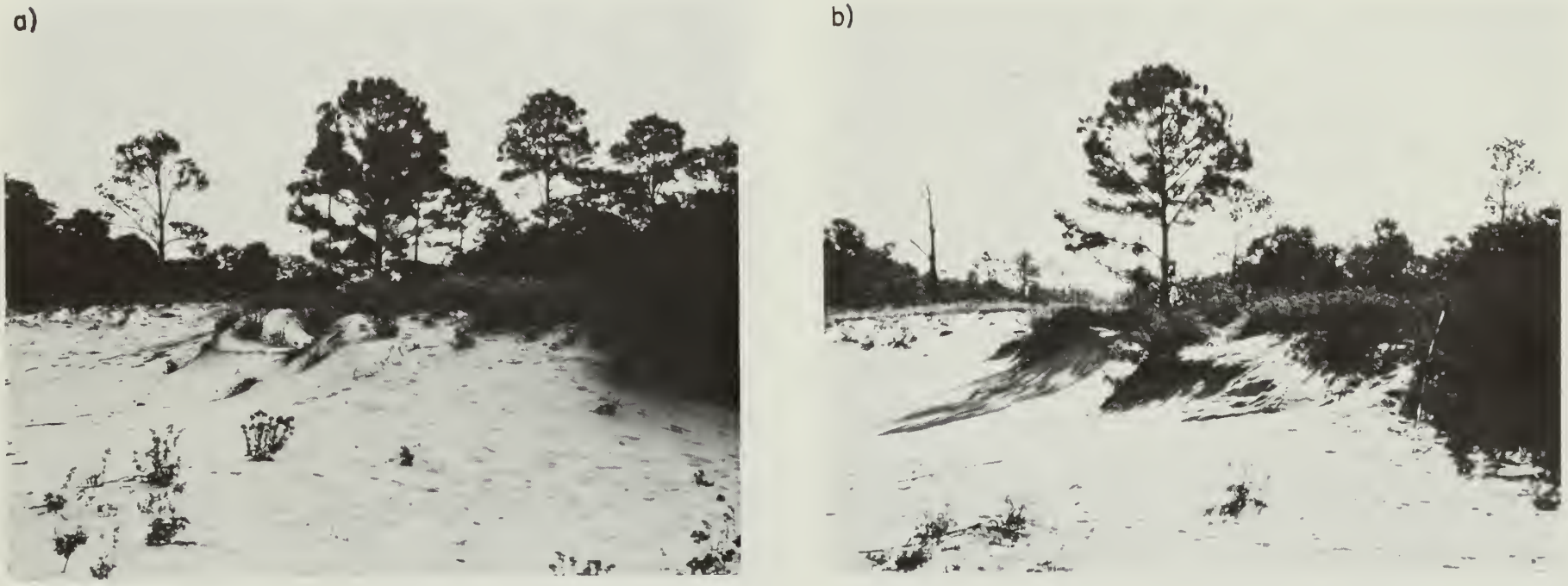

Fig. 11. Reference Marker #17, Photopoint #1, azimuth 130°, Horn Island, Chimney area: pedestrian trail. a) In November 1978, b) In November 1980. Note escarpment near path. Cause and effect?

Fig. 12. Reference Marker #9, Photopoint #1, azimuth 270°, Horn Island, looking west toward wreck of shrimp boat Arcturus. a) In November 1978, b) In September 1979 following Hurricane Frederic. Note expansion of beach and subsidence of wreck, c) In May 1980.

Fig. 13. Reference Marker #7, Photopoint #1, azimuth 260°, Horn Island, east tip, looking west along south shore, Gulf of Mexico to left. a) In November 1978, b) In August 1980. Note extreme shoreline recession and tree stump exposure.

a)

b)

Fig. 14. Reference Marker #8, Photopoint #1, azimuth 265°, Horn Island, south shore, looking southwest. a) In September 1979. Note small overwash pond, b) In May 1980. Note absence of pond, c) In November 1980, d) In February 1981. Note continued absence of overwash pond.

c)

d)

CONCLUSIONS

There are many ways to document changes in a resource. The Reference Marker-Photopoint System is one technique applied to the barrier islands in Gulf Islands National Seashore. However, the system is applicable to other resources and other areas.

Maintaining the natural scene is one of the responsibilities of resource managers in the National Parks. A Reference Marker-Photopoint System was developed with that concept in mind. Markers are easy to use, but not obtrusive. Only those markers were established that were needed to provide the necessary documentation.

The Reference Marker-Photopoint System is in its early stages of development and is continually being improved upon. The information is collected in a consistent manner, thereby increasing the precision of the data and making comparisons through time more accurate. We have found the system enjoyable to work with and useful in assisting us to monitor the resource. If maintained through time, the system can provide useful and much needed long-term management information.

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